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ABSTRACT

Current opinion regarding the nature of the young child's representation of two or more languages is that there is one system during the earliest stages of development. This paper explores theoretical and methodological difficulties underlying this issue. Theoretically, it is questioned what is being claimed about the child's cognitive capacities for language when one versus two systems is discussed. Methodologically, there is the problem that the young bilingual will be limited to a basic phonetic inventory which makes the child appear to have one system. The study pursues the issue of one system versus two by analyzing the acquisition of Italian and English by a young girl L, age 2;0. Results show that L's segmental inventories, but not syllables, were very similar for the languages. In Italian, L used a majority of multisyllabic open syllables, as do some children learning English as a first language. This pattern did not carry over to L's English, which was mostly monosyllabic with closed syllables. These results suggest that L was using separate systems in her phonological development. One needs to be cautious about proposing strategies for phonological development independent of the adult language being learned. L appeared to use opposing strategies for English and Italian. (JK)

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"THE EMERGING PHONOLOGICAL SYSTEM OF AN ITALIAN-ENGLISH BILINGUAL CHILD"

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November 1981

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ABSTRACT

The current opinion regarding the nature of the young child's representation of two or more languages is that there is just one system during the earliest stages of development. The present paper explores some theoretical and methodological difficulties that underlie this issue. Theoretically, there is the question of what is exactly being claimed about the cognitive capacities of the child for language when one versus two systems is being discussed. Methodologically, there is the problem that the young bilingual will be limited to a basic phonetic inventory which de facto makes the child appear to have one system. This study pursues the issue of one system versus two by analyzing the acquisition of Italian and English by a young girl L, age 2;0. The results show that L's segmental inventories were very similar for the two languages, but that the syllables were not. In Italian, L used a majority of multisyllabic open syllables, a pattern used by some children learning English as a first language. This pattern did not carry over to L's English, however, which was mostly monosyllabic with closed syllables. Given these differences in syllabic structure, it is concluded that L was using separate systems very early in her phonological development. Also, the results indicate that one needs to be cautious about proposing strategies for phonological development independent of the adult language being learned. L appeared to use opposing strategies for English and Italian.

1. Introduction [1]

We can define childhood bilingualism as the situation in which a child is exposed to, and expected to respond in, two or more languages. Also, we assume that this occurrence is a natural one in which many, if not a majority, of the world's children find themselves. The interest to the linguist of this topic is to understand how the child develops the knowledge of two languages simultaneously. Previous studies have indicated two contextual aspects of bilingualism: 1. it is common to find use of each language contextually determined, e.g., where each parent addresses and is addressed by the child in a separate language (e.g., Ronjat, 1913; Volterra & Taeschner, 1978), and 2. the use of one language ceases when its environment is removed (e.g., Burling, 1959). Both of these observations indicate an awareness on the child's part of two different languages. The topic of this study is when this awareness emerges. That is, when does the child recognize and linguistically separate two languages?

The common view about the child's awareness of two languages is that initially the child functions with one system. The following lengthy quote from a classic work by Leopold captures this perspective:

> "The child chose either the German or the English item at her own discretion, leaning at first more on German, later more and more decidedly on English, and welded one language instrument out of two...very often the crude phonetic form of the child's words could equally well stand for the English or the German model, because the vocabulary of the two languages is closely related on the elementary level...The split into two contrasting languages, distinguished by the person addressed, first showed rudimentarily and vacillatingly toward the end of the second year. Consciousness of dealing with two languages began early in the third year. Increasingly, from then on, the learning of English and German proceeded separately."
>
> (Leopold, 1953, pg.141).

1. I would like to acknowledge to assistance of Rosanna Matelich who collected the data reported later in this study.

This position is repeated in other works, e.g. Burling (1959), Volterra & Taeschner (1978), Vogel (1975). Burling (1959), for example, states: "Before that, [the differentiation of the vowel systems of Garo and English at 2;8 :DI] he spoke with a single linguistic instrument, forged largely from Garo, but with the addition of English vocabulary and a few extra English phones." (pg.184). Volterra & Taeschner (1978), in a longitudinal study of two German-Italian bilingual children, Lisa and Giulia, expand this perspective into the following three stages:

stage 1. one lexicon, with words from both languages;
stage 2. two lexicons, but one syntax;
stage 3. two lexicons, with two syntactic systems. The languages are context-bound, with separate languages for specific speakers.

Of special interest here is the implicit claim that the phonologies of the languages are separated (stage 2) before the syntax (stage 3). The authors do not, however, provide phonological analyses to justify this separation. Rather, they say that a separation occurs when the child uses words from both languages for the same meanings. One could equally argue that one phonological system is used for both, however, and that the phonologies of the two lexicons separate later. Specifically phonological analyses are necessary to resolve which of these two alternatives actually occurs.

The only study specifically on phonology is that of Vogel (1975), who studied an English-Romanian child, Eileen, at 2;0. Using a data base of 85 Romanian and 70 English words produced during a spontaneous language sample, Vogel analyzed the two sets of words for: 1. their segmental inventories; 2. the substitution patterns and phonological processes. She found few differences between the two sets of words, except for ones attributable to differences between the languages, such as the fact that Romanian relatively has few final consonants, and more initial unstressed syllables. She concludes that Eileen was functioning with one phonological system.

The specific goal of the present study is to examine the issue of when the young bilingual child shows two phonological systems. This will be done by first presenting a general discussion on some difficulties of

resolving the issue, and some problems that exist in the previous studies on the topic (Section 2). Specifically, it is proposed that children learning highly different languages will need to be studied in order to decide whether the child has one or two systems. Also, an analysis procedure is proposed that can more effectively examine this issue by a) looking at syllable structure as well as segmental inventories, and b) providing specific measures of both. Section 3 presents an analysis of data collected from a two-year-old girl learning Italian and English, languages that differ greatly in their syllable structure. The results of the analyses indicate that the child has two separate phonologies. The paper concludes that bilingual children may have separate phonologies very early in language acquisition (Section 4). The last section also briefly addresses the relevance of these results to recent claims about the use of individual strategies of acquisition.

2. The Separation of Phonological Systems

The commonly accepted view of the child having one system at the onset fits well with some recently proposed aspects of language acquisition. For one, children across cultures tend to show one set of similar speech sounds in their first words, seemingly independent of the language heard (Locke,1981). Also, the meanings of the first words themselves appear distinct, with their origins being the child's intentions rather than adult meanings (Halliday, 1975). Elsewhere, (Ingram,1976), I have referred to the earliest stage of phonological development as the Phonology of the First 50 Words, and have suggested that it may have properties unique from subsequent development.

Assuming for now that the first words are one system, the next question is when they separate into two languages. Although the data are not always precise, the studies already mentioned suggest not until the vocabulary is larger. Table 1 presents the data on four children who were claimed to have a single lexicon, and hence one phonological system.

(insert Table 1 about here)

The first three children, Lisa, Giulia, and Hildegard, are ones studied in Volterra & Taeschner (1978), with the data from Hildegard taken from Leopold (1970). These data indicate that one system lasts beyond the child's first attempts at words. Smith's study (1926) on vocabulary growth found that on the average the child's 100th word is not used until 10 months after the appearance of the first word. Also, Benedict (1979) has found a child's receptive vocabulary on the average around five months ahead of the child's productive vocabulary. To summarize, the current view is that one phonological system exists in production up to and perhaps beyond the acquisition of the 100th word, at a time when the child's receptive vocabulary is considerably larger.

The postulation of one phonological system has important implications for our theoretical claims about the relation between language input and the child's internal processing strategies. In Piaget's theory of cognitive psychology (e.g., Piaget & Inhelder, 1969), this relationship is described by processes of accommodation and assimilation. In assimilation, the child creates structures and modifies the input according to his/her own internal structures. These, in turn, are modified or accommodated to the input. In phonological development, we can conceive of the child's use of her own system as a process of assimilation, i.e., a change of the shape of words heard to conform to the child's own strategies for the organization of words. Despite the fact that the child needs to 'discover' the system of the adult language, we can view this change as accommodation. That is, the input data forces the child to change the structures he/she has formulated. The claim that the child has her own system as summarized above is also a claim that the child assimilates the words of the input languages with virtually no accommodation for several months.

There are several aspects of this opinion that need to be examined closely. First, what is the claim being made about perception? Eileen (Vogel,1975), for example, is at Stage 2, i.e., she has two lexicons and one phonology, based on Vogel's interpretation. Does this mean that she

perceives one language, with multiple lexical forms used by different speakers? Consistent response to one parent or another would indicate a separation, but Vogel states that this was not the case (pg.45). Despite a growing literature on infant speech perception, no research has attempted to determine when a child perceives languages as being distinct from one another. The extent of the child's abilities in this regard, however, as revealed by these studies on infant perception, suggests the possibility of separation quite early. Also, the tremendous disparity between receptive and productive vocabularies in young children, with some showing as many as 200 words comprehended before any words produced (Benedict,1979), indicates that the young child knows many words before production begins. If the young child does begin to identify separate languages at the onset of word production, then the claim is one that is restricted to production.

A more serious question concerns how we show that there is one or two systems. If we compare the linguistic systems of two adults, one French and the other English, we conclude two languages on the grounds that their sounds and rule systems are distinct from each other, and they represent distinct lexical items. If the distinct sounds were on morphemes with shared meanings, it would be a case of dialect variation. Given this, it would be difficult (but not impossible) to prove separate phonologies for bilingual children at Stage 1. For those at Stage 2, however, the task is easier. If two languages are present, then the sounds and phonotactic constraints should be different for the two lexicons. In Vogel (1975), some differences were noted in the sounds used for the English and Romanian words. Vogel states the following (pg.51):

> "At first glance, the final consonants appeared to be behaving differently in the two languages. It seemed that the deletion of final consonants was quite common in English words, but rather infrequent in Romanian words. Upon closer examination, however, the cause of this difference became clearer. There were simply not very many instances of consonants occurring in final position in the adult versions of the Romanian words Eileen had learned, whereas there were many more in her English words...Rather than representing different processes and therefore different linguistic systems, the difference in the number of deleted final consonants in Eileen's Romanian and English reflected differences in the phonological distribution of the two languages."

A close look at this conclusion reveals a spurious argument. The statement claims that differences between the phonological analyses of the two lexicons can be assigned to differences between the two input languages. Since all languages are different from one another, all differences in output are always the result of such differences. Thus, all bilinguals have one system, with differences in output always due to input differences. Such logic renders the topic prejudged and uninteresting.

If we wish to conclude one system or two, we will need to compare the phonological systems of the separate lexicons independent of the characteristics of the input language. The use of one system for two highly different input languages is not only conceivable but likely, given current findings on active phonological strategies used by young children. This point is based upon studies showing individual strategies used by children during phonological acquisition. Schwartz,Leonard,Wilcox and Folger (1980), for example, report on children learning English as being reduplicators or non-reduplicators. Since the input language is the same for all of their subjects, the implication is that some children have an inherent preference toward one or the other strategy. Ingram (1974) noted a tendency in two children, one English and the other French, to produce consonants in a word in a manner such that more forwardly articulated ones precede those articulated at a more backed position. Returning to English, Ingram (1981) also reports variation in the use of closed syllables, with some children preferring closed syllables and others open ones. Daniel Menn, for example, (Menn, 1971), actually was better at the production of final consonants than that of initial ones. Children also show preferred canonical shapes, as in the case of Priestly (1977), whose son imposed a CV/j/VC shape upon his words.

Returning to the Vogel study, one phonological system indicates one set of segments and one set of preferred canonical shapes. If Eileen has a final consonant preference, this should be carried over to words in Romanian without final consonants, just as Priestly's son used his CVjVC shape to a large number of words without medial /-j-/ in their models. Likewise, the child in Ross (1937) applied reduplication to monosyllabic models. The fact that Eileen did not extend final consonant production, however, suggests an awareness of separate systems.

The study of a child bilingual in English and Romanian is difficult for the question, however, because the languages are relatively similar in consonant inventory and syllable structure, given the general simplifying tendencies children use. Suppose, for example, a child shows the following initial stops for two different languages, where parentheses indicate infrequent, and asterisks indicate frequent sounds:

LA:	p *	(t)	k *
LB:	(p)	t *	k

Do we wish to say the child has one system or two? A better test case of this issue is one where the two target languages are phonologically distinct to the point where they suggest different strategies. English, for example, is highly monosyllabic, and uses many final consonants. If anything, it should trigger a tendency toward monosyllables and closed syllables. Other languages, however, such as Italian, tend to be multisyllabic and open syllabled. A child who has an inherent tendency toward monosyllables and closed syllables will not look peculiar learning English, but will look unique when producing Italian words. The next section reports on a phonological analysis done on an English-Italian child who was at a comparable stage as those reported in Table 1.

3. The Phonology of an Italian-English Child

The child studied, L, lived in an Italian household in Vancouver, B.C. Italian was the predominant language used in the home, although L learned some English from television and occasional English discussion. Her older sister, a university student who collected the data, reported L as learning predominantly Italian with some English. A language sample was collected from L at 2;0, in a naturalistic setting when the mother and the older sister were present. L was only addressed in Italian, and she produced 256 sentences during the session. Most utterances were single words, with a few two- and three-word utterances. The occurrence of multi-word utterances suggested that she was beyond the first stage of holophrastic speech and the Phonology of the First 50 Words. The sample yielded 100 Italian words and 36 English ones, reflecting the dominant Italian influence (See Appendix).

The two lexicons were given a phonetic analysis based on the procedures presented in Ingram (1981, Chapter 3). The analyses yielded information on the following:

1. Articulation Score
2. Phonetic Inventories (initial, medial, final)
3. Proportion of Monosyllables
4. Proportion of Closed Syllables

The Articulation Score is a gross measure of development, like the MLU in syntax. It assigns points to sounds that are part of the child's phonetic inventories. Transition sounds (those in parentheses) get one point, frequent sounds get two points, and highly frequent sounds get three points. Sounds are considered part of a child's phonetic inventory if they meet a criterion of frequency (CF), which is determined by dividing the total number of words by 25. This is done on the arbitrary assumption that a sound must occur at least once every 25 words to be considered used. For example, a sample of 100 words has a criterion of frequency of 4. For a sound to be transitional, it must occur at least one-half of the CF. To be frequent, it must meet the CF, and to be highly frequent, it must occur at least twice the CF. If the CF is 4, transitional sounds occur 2 or 3 times, frequent ones 4,5,6 and 7 times, and highly frequent ones 8 or more times. A further condition is that sounds must occur twice to be part of a phonetic inventory, so that there are no transition sounds when the CF is 2. The other measures are calculated as follows:

Proportion of Monosyllables: number of monosyllables divided by the total number of phonetic forms;

Proportion of Closed Syllables: number of CVC forms divided by number of CV and CVC forms.

In addition, the following measure was also used, taken from Fee & Ingram (in press):

Proportion of Reduplication: number of reduplicated forms divided by the total number of reduplicated and non-reduplicated multisyllabic forms.

Table 2 presents the results of the analysis.

(insert Table 2 about here)

The Articulation Score (AS) is much higher for Italian, confirming the report that L is more advanced in Italian than in English. Previous use of the AS for English (Ingram, 1981), French (Ingram & Mitchell, 1981), and Cantonese (Tse, 1981) has shown that 50 is a typical AS of the average two-year-old. The discrepancy does not necessarily mean separate systems, however, since the smaller English inventory could be just a subsystem of the Italian one.

The phonetic inventories present a complex set of information. For initial consonants, the English sounds used constitute an exact subset of the Italian inventory. The only difference is that the Italian lexicon shows three additional sounds [n] [s] [k^w]. This suggests one system at work for the two languages. This conclusion needs to be modified for medial sounds in that the Italian lexicon shows many more sounds, indicating this position as a more important one for Italian. The English sounds are still a subset, however, except for [b] . The final consonants, however, show separate systems at work. English shows four sounds to the one in Italian, and the frequent final [-l] of Italian is not used in the English data. The initial and final sounds, then, present opposite pictures of L's system, with only the final one indicating separate systems.

The Proportion of Monosyllables and Proportion of Closed Syllables show two distinct patterns. For English, the majority of words are monosyllables, and most of these show final consonants. A study of 15 English children between 1;3 and 2;0 in Ingram (1981) reports mean scores of .70 and .50 respectively, indicating that L shows slightly fewer monosyllables but many more closed syllables than the average English-learner. Her Italian words, however, are mostly multisyllabic and open. The discrepancy between the two lexicons also appears in the Proportion of Reduplication which is much higher for the Italian words. Interestingly, this measure is independent from the Proportion of Monosyllables so that the difference on the latter measure should not necessarily influence the rate of reduplication (c.f. Fee & Ingram, in press).

These results present the picture of a child whose phonological output for English and Italian is highly influenced by the phonological form

of the adult models. Stated differently, there is evidence for two phonological systems in the sense that there are specific tendencies in the output that help identify words as belonging to one lexicon or another. The only exception to this is the initial consonant inventories which are highly similar.

If we compare the results from this study to that of Vogel (1975), it is possible to account for the differences by saying that the children are at different stages and that L is further advanced than Eileen. Even though both children are 2;0, it may be that L is learning faster. Earlier, the two were grossly matched for vocabulary size. This is a somewhat artificial measure, however, since it will be affected by sample size. Another possible measure for comparison is the Articulation Score. Table 3 presents a re-analysis of Eileen's data using the approach applied to L's data.

(insert Table 3 about here)

The Articulation Scores of L and Eileen for English are relatively close, .36 and .40 respectively, but those for Italian and Romanian are further apart, being .46 and .68 respectively. Thus it is possible that L's more advanced development in Italian may have led to a separation. It is an open question whether data from a child at a lower level would show one or two systems. As pointed out, data from distinct languages will need to be used to resolve the question. Even given the similarities between English and Romanian, some hints at differences appear in Table 3. For each word position, there are some discrepancies in the phonetic inventories for the two languages. Also, the Proportions of Monosyllables and Closed Syllables show Romanian words to be more multisyllabic and open syllabled than the English ones. The differences are not so great as in the case of L, however, and one can see why Vogel would be led to conclude one system from these data.

4. On Individual Strategies

The preceding study has attempted to open up the issue of when children show two phonological systems when learning two languages as first languages. I have raised questions about the role of perception, and the way in which one analyzes production data to conclude one or two systems. Further, I have presented some preliminary data from an Italian-English learning child who showed two separate systems. It is an open question when the separation begins, yet one which can be resolved by observing children who are learning highly different languages, using explicit measures of analysis. My impression is that it may be earlier than has been expected, possibly during the acquisition of the first 50 words.

A further issue addressed by these data is the role of individual strategies in phonological acquisition. Recent studies have focused on individual variation (e.g., Schwartz et al, 1980; Ferguson & Farwell, 1975), and either implicitly or explicitly assign such strategies to inherent preferences in the child. The data from L, however, raise questions about how independent these tendencies are from the input language. For example, if a tendency to reduplicate is an inherent tendency, than reduplication should occur regardless of the input language. As we found, though, L was a reduplicator for Italian but not for English. Indeed, L seemed to show an opposite preference for English, even though studies on English reduplication show some children with rates at or above that shown by L for Italian (Schwartz et al, 1980; Fee & Ingram, in press). Looking at L's lexicons, in fact, gives one the impression that they were produced by two separate children.

These results indicate that the preferences a child shows may vary greatly depending on the language being learned. It appears that the phonological shape of the input language plays a greater role in early phonological development than has been proposed, and that one needs to be cautious about concluding inherent preferences or strategies of acquisition. Future research will need to look at the factors of different languages that trigger certain preferences over others.

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Table 1. Number of words in the vocabularies of four bilingual children who were claimed to have one lexicon.

Child	Language	No. of words	Total
Lisa (1;11)	Italian	38	
	German	25	
	Italian-German *	24	87
Giulia (1;6:15)	Italian	27	
	German	33	
	Italian-German *	22	82
Hildegard (1;6)	English	36	
	German	24	
	English-German *	29	89
Eileen (2;0)	English	70	
	Romanian	85	155

*Words that have possible models in both languages.

Table 2. Results of analyses of L's English and Italian lexicons on five aspects of phonetic development.

Measure	English	Italian
1. Articulation Score	36	68
2. Phonetic Inventories		
initial (circled sounds are those that differ)	m p b* t d k* f	m (n) p* b* t* d k* f* (s) (kʷ)
medial	n (b) d s	(m) n* (p) (t*) d (ʧ) (k) (v) s (z) (l*)
final	(n) (p) (kʷ) (s*)	(l*)
3. Proportion of Monosyllables	.60	.10
4. Proportion of Closed Syllables	.81	.36
5. Proportion of Reduplications	.05	.18

Table 3. Analysis of data on Eileen from Vogel (1975) using measures in Ingram (1981).

Measure	English	Romanian
1. Articulation Score	40	46
2. Phonetic Inventories		
initial	m n	m n
(circled sounds are those that differ)	p b t d k g (f) (ʃ) (h) (w) (j)	p* b (t) (d) (tʃ) k (g) ( ) (s) ʃ (h) (j)
medial	n*	
	(b) t d (tʃ) k (h)	(p) t d (tʃ) k (s) (ʃ) (h) (ts)
final	n*	(n)
	t	(t) (tʃ)
	(s) ʃ	(ʃ)
3. Proportion of Monosyllables	.49	.38
4. Proportion of Closed Syllables	.46	.37
5. Proportion of Reduplications	.04	.07

Appendix A. Lexicon of words produced by L with Italian models. Standard Italian is given in quotations. Sample productions of the dialect heard by L are given in slant lines. The more striking features of this dialect are: 1) lack of gemination, e.g. "brutto" /bruto/, 2) loss of some final vowels e.g. "coltello" /kotɛl/, 3) palatalization, e.g. "chiave" /tʃavɛ/.

Adult model	L's word	meaning
1. 'acqua'	akwa	water
2. 'adesso'	deso	now
3. 'aeroplano' /roplani/	opani	airplanes
4. 'altro'	ato	other
5. 'anche'	aŋkɛ	also
6 'ancora'	ankola	still
7 'aspetta' /spɛta/	pɛta	wait
8. 'barca'	baka	boat
9 'basamenta'	mɛnto	base
10. 'bere' /bɛvɛr/	bɛvɛl	drink
11 'bestia' /bɛʃa/	bɛtsa	animal
12. 'bianchi'	biaŋki	white(pl.m)
13. 'biscia' /bisa/	bisa	snake
14 'bocca'	boka	mouth
15 'braccialetto'	bitʃalɛto	bracelet
16. 'brutto' /bruto/	buto	ugly
17. 'buzzo'	buzo	belly
18 /buba/	buba	hurt
19 'capello' /kapɛl/	kapɛl	hair
20 'cattiva'	kakia	bad(f)
21. 'cattivo'	kakio	bad(m)
22 'chiappa' /tʃiapa/	tʃapa	bottom
23 'chiave' /tʃiavɛ/	çavɛ	key
24. 'cinque'	sinkuɛ	five
25. coccodrillo'	kokodio	crocodile
26. 'collana'	kadɛna	necklace
27. 'come'	komɛ	how
28. 'con'	kon	with
29. 'coltello' /kotɛl/	kotɛl	knife
30 'corlo'	kolo	get-it
31. 'cornacchia' /kornaʃa/	kuaça	crow
32. 'corre' /kori/	koli	run
33. 'cos'e' /zɛ/	zɛ	what is it?
34. 'dentro'	dɛnto	inside
35. 'dottore' /dotor/	dotol	doctor
36. 'dove'	doɛ	where
37. 'due'	duvɛ	two
38. 'elefanta'	fantɛ	elephant
39. 'fa'	fa	do
40. 'fare' /far/	fal	to do
41. 'farfalla'	fafala	butterfly
42. 'fatto' /fato/	fato	done
43. 'fiore' /fior/	fol	flower
44. 'fiori'	foli	flowers
45 'foglie'	foɪɛ	leaves
46. 'forbici'	fobitʃi	scissors
47. 'fronte'	fontɛ	front

Appendix A (continued)

Adult model	L's words	meaning
48. 'fuori' /fora/	fola	out
49. 'gallo'	galo	rooster
50. 'gambetti'	mbɛtɛ	small legs
51. 'giallo'	dʒalo	yellow
52. 'giraffa'	dʒiafa	giraffe
53. 'granda'	anda	big(f)
54. 'grando'	ando	big(m)
55. 'guarda'	vada	look at
56. 'in'	in	in
57 'leone'	leon	lion
58 'Lila'	lila	Lila
59. 'Lilliana'	iana	Lilliana
60 'lunghe'	uŋi	long(f,pl)
61. 'magna'	maɲa	large
62. 'mamma'	mama	mama
63. 'mangiare' /maɲar/	maɲal	eat
64. 'martello' /mart l/	matɛl	hammer
65. 'matita'	matita	pencil
66. 'medicina'	metʃina	medicine
67. 'metti' /mɛti/	mɛti	put
68. 'mosca'	mokɛ	fly
69. 'muro'	mulo	wall
70 'nasa' /naza/	naza	
71 'nuvole' /nuvoli/	nuvoli	clouds
72 'occhiali' /ot ai/	tʃai	glasses
73 'ombrella'	mbɛla	umbrella
74. 'orologio'	odʒo	clock
75. 'otto'	oto	eight
76. 'per terra'	pɛtɛla	on ground
77. 'pesce' /pɛsɛ/	pɛsɛ	fish
78. 'pesci' /pɛsi/	pɛsi	fish(pl)
79. 'piace' /piazi/	pazi	like
80. 'pianta'	panta	tree
81. 'piante'	pantɛ	trees
82. 'piccolo' /pitʃo/	pitʃo	little
83. 'piccoli' /pitʃi/	pitʃi	little(pl)
84. 'pinguini'	kuiŋguini	penguins
85. 'piove' 'piova/	pova	rain
86. 'polizia'	potʃia	police
87. 'pomo'	pomo	apple
88. 'potta'	pota	door
89. 'quarto'	kwato	fourth
90 'quel'	kwɛl	what
91. 'questo'	kwɛto	this
92. 'qui'	kwa	here
93. 'radicio'	aditʃo	
94. 'ragazza' /tata/	tata	girl
95. 'ragazzo' /tato/	tato	boy
96. 'ragazzi' /tati/	tati	children
97. 'ragno'	aɲo	spider
98. 'Rosana'	nana	Rosana
99. 'salta'	sata	jump
100. 'scartoccio' /skartotʃo/	katotʃo	unpack

Appendix A.(continued)

Adult model	L's words	meaning
101. 'scimmia' /simia/	simia	monkey
102. 'sedia'	seda	chair
103. 'si'	si	yes
104 'soldi'	sodi	pennies
105 'sorci' /sorzi/	sozi	mice
106 'sorelle' /sorele/	solɛl	sisters
107. 'spalla' /spala/	pala	shoulder
108. 'strada'	tada	street
109. 'sua'	suva	her/his
110. 'tante'	tantɛ	many(pl,f)
111. 'tartaruga'	tatauga	turtle
112. 'telefono'	tɛfono	telephone
113. 'terra'	tɛla	ground
114. 'tre'	tɛ	three
115 'tutti' /tuti/	tuti	all(pl)
116. 'tutu'	tutu	aunt
117. 'uno'	no	one
118 'uovo'	ovo	egg
119 'uovi'	ovi	eggs
120 'vespa'	vɛpa	wasp
121. 'vien'	viɛn	come
122. 'volpe'	vopɛ	fox

Appendix B. Lexicon of words produced by L with English models.

Adult model	L's word
1. 'bike'	baik
2. 'birdie'	budi
3. 'boot'	but
4. 'baby'	beibi
5. 'Burt'	but
6 'bunny'	bʌni
7. 'bug'	bʌk
8. 'blue'	bu
9 'choo-choo'	tutu
10 'come-on'	kʌman
11 'drink'	diŋk
12. 'ducky'	dʌki
13. 'Elsa'	ɛsa
14. 'five'	fai
15. 'flowers'	fawos
16. 'hi'	ai
17. 'horsie'	osi
18. 'house'	aus
19. 'help'	eup
	eu
20. 'juice'	dʒus
21. 'kleenex'	kinis
22. 'lunch'	ontʃ
23 'minutes'	minis
24. 'Mary'	mewi
25 'okay'	kei
26. 'pig'	pik
27. 'park'	pak
28. 'please'	piz
29. 'radio'	ɛdio
	adio
30. 'rabbit'	wæbi
31. 'shake'	nɛk
32. 'squirrel'	kul
33. 'train'	tein
34. 'truck'	tok
35. 'yuck'	iʌk
36. 'zipper'	zip